(7) GB 0208 PCT

(12) UK Patent Application (19) GB (11) 2 096 671 A

(21) Application No 8210357
(22) Date of filing 7 Apr 1982
(30) Priority data
(31) 8111448
(32) 11 Apr 1981
(33) United Kingdom (GB)
(43) Application published
20 Oct 1982
(51) INT CL³
E21C 35/12
(52) Domestic classification
E1F 17
B8A LF R4 S31 W9
(56) Documents cited
GB 1335384
(58) Field of search
E1F
(71) Applicants
Pitcraft Summit Limited,
Pioneer Works, Mason
Way, Platts Common
Industrial Estate, Hoyland,
Nether, Nr. Barnsley,
Yorkshire
(72) Inventor
Leslie Baines
(74) Agents
Hulse and Co.,
Cavendish Buildings,
West Street, Sheffield,
S1 1ZZ

(54) Line pan

(57) A line pan 1 comprises a pair of spaced apart, parallel sidewalls 2, 3, each sidewall 2, 3 being welded to opposite, longitudinal edges 5 and 6 of a common, interconnecting deckplate 7, and each sidewall 2, 3, at a lower edge 10, 12 thereof being welded to a base plate 11, 13 and at an upper edge 14 being welded to an upper plate 15, 17 located in a plane parallel to that of the base plate 11, 13, the base plates 11, 13 of each sidewall 2, 3 having a portion 18, 19 projecting beyond the sidewall 2, 3 in a direction away from the deckplate 7, at least one projecting portion 18, 19 being at least partially superposed by a projecting portion 21 of an upper plate 15, 17, and a support plate 22, for carrying furnishings such as a rack bar 37 or ladder arrangement, welded to both the upper and base plates 17 and 13 of one of the sidewalls 3.

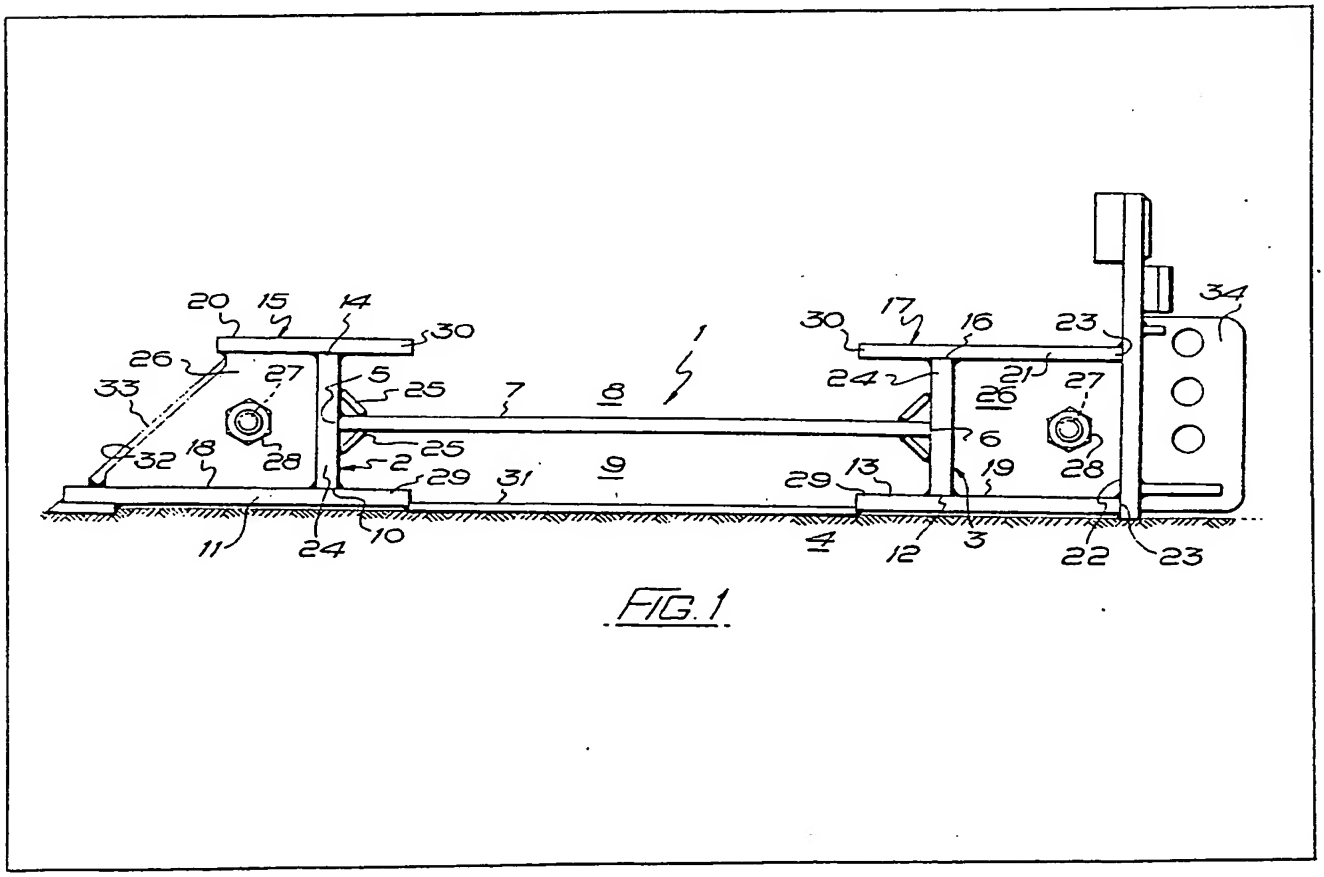

FIG. 1

GB 2 096 671 A

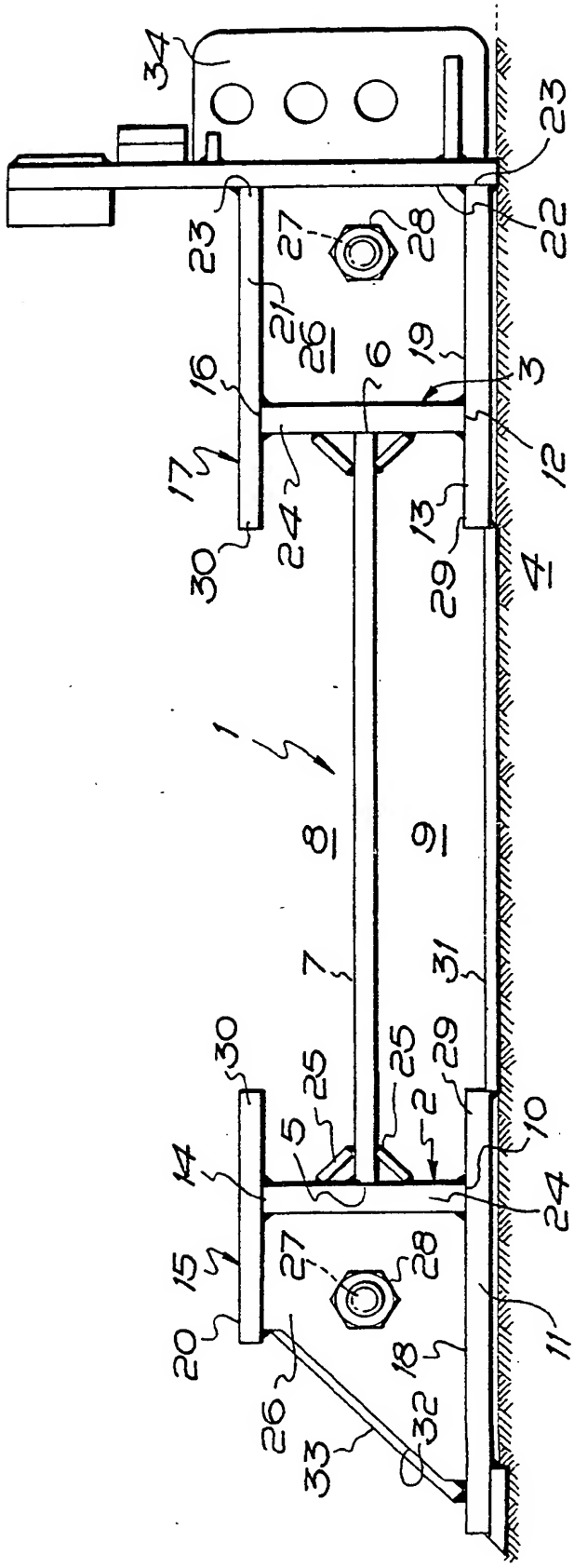

FIG. 1

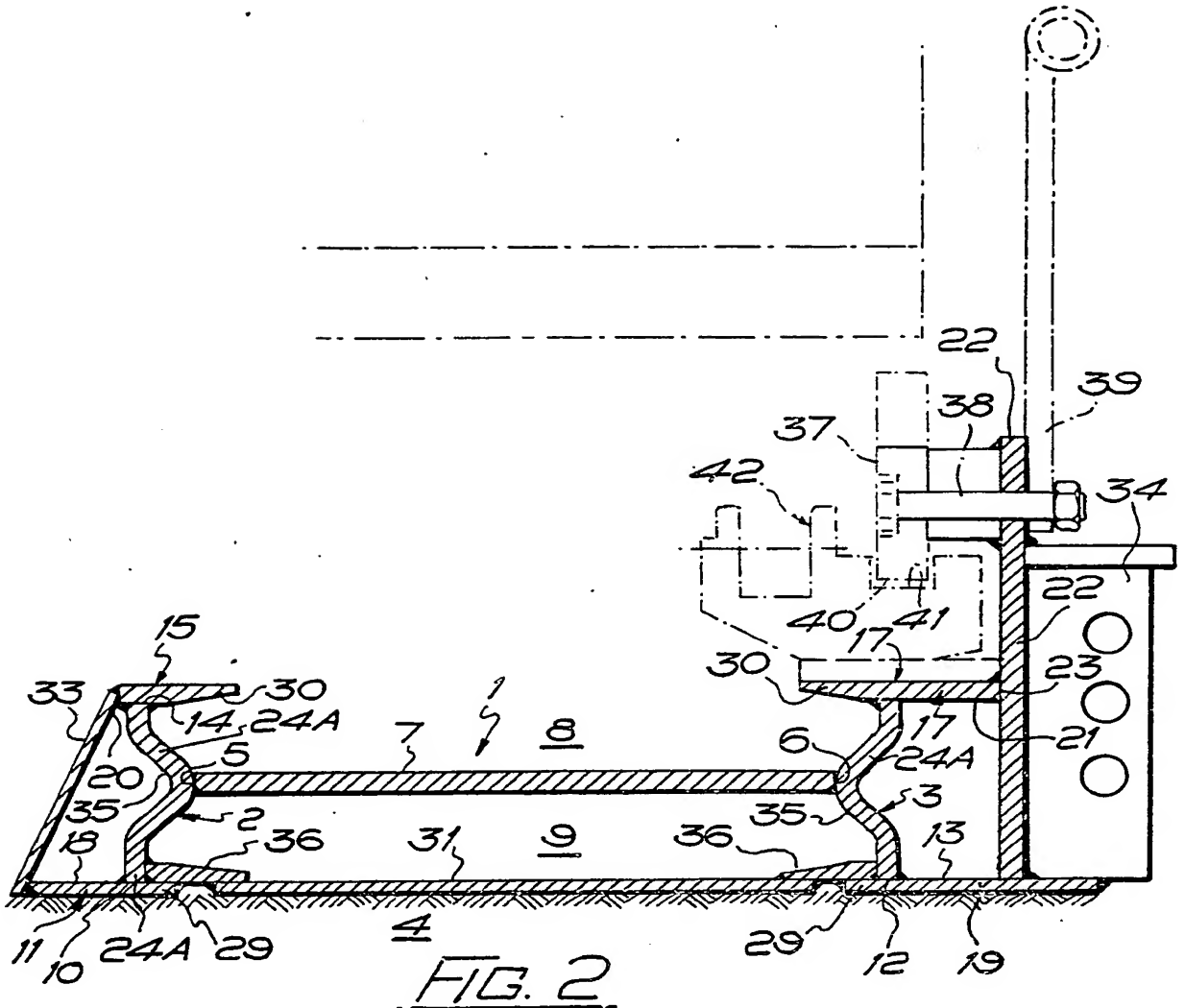

FIG. 2

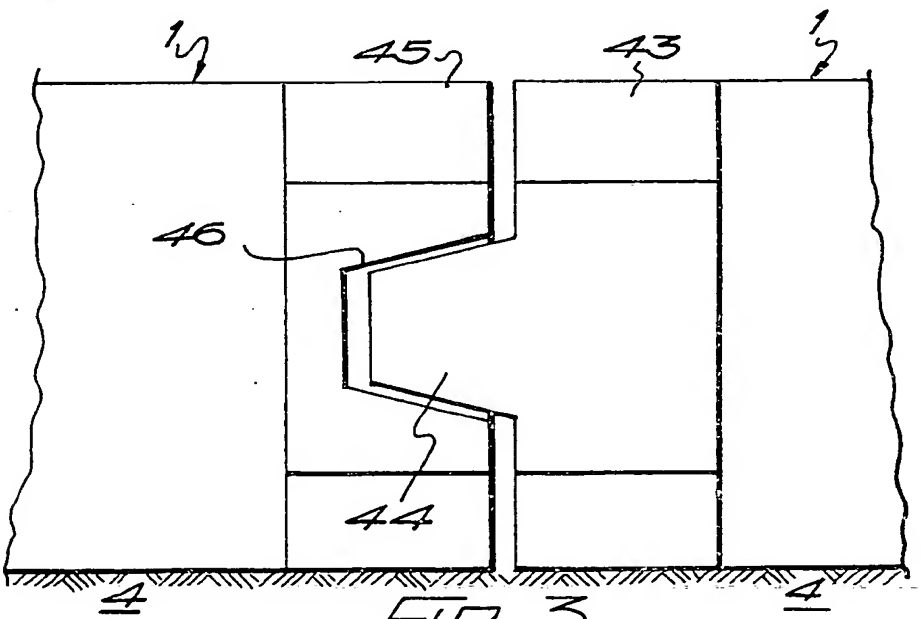

FIG. 3

SPECIFICATION

Line pan

This invention relates to a line pan, to form part of a scraper chain conveyor, by being secured end-to-end to similar line pans, each for example of 5-ft length, to make up a conveyor of the desired length, e.g. 200 yds, with a drive head at one or both ends of the conveyor for driving the conveyor chain(s). Conventionally each pan comprises a pair of elongate, mutually facing, sigma section sidewalls, spaced from one another by an interconnecting deckplate welded to each sidewall, the deckplate additionally separating an upper conveying run, and a lower return run, of each pan.

Such conveyors have been used extensively in the longwall mining of minerals, particularly coal, where a mineral winning machine is mounted on, and guided by, the conveyor, employing the pan sidewalls in the manner of a rail track. However, increasing sizes of mineral winning machines have led to increasing loads imposed on the sidewalls, and in particular the upper flanges thereof, which has led to those flanges becoming damaged, or bent downwardly, thereby impeding efficient operation of the conveyor. The sigma section sidewalls are manufactured by rolling, to a relatively complex sigma profile, or by casting, and the repeated demand for pans of ever increasing strength has necessarily led to increased pan dimensions, weight and costs, not to mention the additional rolls or moulds required for a range of sidewall profiles. Furthermore, with the modern tendency to haul mining machines by the chainless technique (operating on a rack and pinion principle) there is a further demand for the conveyor to be able to support and carry a rack bar or ladder arrangement (engaged by pinion means or an endless haulage chain of the machine) as well as the need to carry conventional furnishings such as spill plates on the goaf side sidewall and ramp plates on the face side sidewall. To carry such furnishings, extensive and hence costly machining operations are required to provide the necessary bolt holes etc. When operating by the chainless technique, the machine reacts on the pans, which are connected together end-to-end, by bolts or more recently by dog-bone connectors. However, with conventional sigma sidewalls the maximum bolt diameters that can be employed is 7/8", which is often inadequate especially as chainless haulage lends itself to multi-machine operation on the conveyor. Also, it is often impossible to position these bolts at the best locations for optimum load transmission.

According to the present invention, a line pan comprises a pair of spaced apart, parallel sidewalls, each sidewall being welded to opposite longitudinal edges of a common interconnecting deckplate, and each sidewall, at a lower edge, being welded to, a base plate, and at an upper edge being welded to an upper plate located in a plane parallel to that of the base plate, the base plates of each sidewall having a portion projecting beyond the sidewall in a direction away from the deckplate, at least one projecting portion being at least partially superposed by a projecting portion of an upper plate, and a support plate, for carrying furnishings, welded to both the upper and base plates of one of the sidewalls.

Thus, the invention provides an all fabricated line pan, in which all, or substantially all, plate material may be employed, the material being burnt or cropped from flat rolled stock. The limitations imposed by pre-determined dimensions and load bearing capacities of rolled sigma section sidewalls are obviated, as is the consequent expense when it is desired to increase these characteristics, while machining operations are virtually eliminated. In effect the pan configuration in general and/or load bearing capacity in particular may be readily modified to suit particular service requirements. Thus pans can be manufactured from a variety of plate material thickness and/or sidewall heights, and/or base plate widths and/or upper plate widths etc.

In a first embodiment, each sidewall may comprise a vertical plate, while in a second embodiment, each sidewall may comprise a plate, previously planar, from which a generally central, longitudinally extending notch or "V" groove has been pressed or rolled, the notches or grooves being inward of the pan and mutually facing one another.

With either embodiment, each sidewall may incorporate one supporting rib at or towards each end thereof, each rib being apertured, e.g. by providing a drilled hole in each end rib — which is basically the only machining operation involved — to receive a connecting bolt for securing together adjacent ends of adjacent pans. Furthermore, it is readily possible for the apertures to be positioned, with respect to the adjacent sidewall and support plate, for optimum load transmission, without dimensional constraints. Thus, for instance, 2" dia. connecting bolts or heavy duty "dog-bone" connectors can be employed. It may also be necessary to provide one or more intermediate ribs, between the ends of the sidewalls.

It is also preferred for each sidewall to be seated on its base plate, which preferably has an inwardly projecting edge.

For longwall mining application, one sidewall would be a face side sidewall and the other sidewall would be a goaf side sidewall. Thus it is preferred for the face side sidewall to have an inclined leading face, provided by a ramp plate, of length corresponding to that of the sidewall, and welded into position to provide an enhanced mineral loading action onto the pans. Preferably, the support plate is connected to the goaf side sidewall, while a furnishing in the form of a rack bar or ladder arrangement may be secured by bolts to the support plate, if the pan is intended for use with a mineral winning machine hauled by the so-called chainless technique. In detail, the goaf side sidewall may basically be a generally rectangular box section defined between the upper and base plates, the sidewall and the

support plate. Furthermore, supporting ribs may be provided within the box section, one being located at least at or adjacent each end of the sidewall, with at least these end ribs again being apertured to receive a connecting bolt, for securing together adjacent ends of adjacent pans. To the support plate may also be welded ancillary furnishings, e.g. a clevis rail for attachment of the advancing rams of conventionally provided roof supports.

It is also preferred for the lower, conveying run, to be closed by a floor engaging closure plate welded between adjacent edges of the base plates of both sidewalls. Finally, to ensure that the first embodiment of conveyor can operate with conventional flight bars, angled webs may be welded across the corners of the deckplates and each sidewall, so that the sidewalls approximate to the conventional sigma section.

Preferably, at one end of the pan, each sidewall is provided with a male projection and at the other end with a complementary female recess, to assist in end-to-end location of adjacent pans. This may readily be achieved — as may successful integration with conventional line pans — by welding end pieces to the ends of the sidewalls of the line pans of the invention, each end piece corresponding in profile to a conventional rolled sigma section sidewall, the end pieces preferably being castings. Hence, the end pieces would incorporate either a male projection or a female recess.

The invention will now be described in greater detail, by way of examples, with reference to the accompanying drawings, in which:—

Figure 1 is a sectional view through a first embodiment of line pan in accordance with the present invention;

Figure 2 corresponds to Figure 1 but shows a second embodiment; and

Figure 3 is an elevation, to an enlarged scale, of adjacent ends of two adjacent pans of the embodiment of Figure 1 or Figure 2.

In the drawings, like reference numerals are used for like components, in both embodiments.

A line pan 1 comprises a pair of spaced apart, parallel sidewalls, being a face side sidewall 2 and a goaf side sidewall 3, the pans being of unit length, e.g. 5-ft. and being adapted to be secured together, end-to-end, to make up a scraper chain conveyor of desired length, the pans 1, and conveyor being, in use, seated on a mine floor 4.

In both embodiments, each sidewall 2, 3 is welded to opposite, longitudinal edges, 5 and 6 respectively, of a deckplate 7 which separates an upper conveying run 8 from a lower conveying run 9, the chain(s) and flight bars of the conveyor being omitted. Lower edge 10 of the sidewall 2 seats upon and is welded to, a base plate 11, while lower edge 12 of the sidewall 3 seats upon, and is welded to, a base plate 13. In addition, upper edge 14 of the sidewall 2 is welded to an upper plate 15 located in a plane parallel to the base plate 11, while upper edge 16 of the sidewall 3 is welded to an upper plate 17 located in a plane parallel to that of the base plate 13. The base plates 11 and 13 have a portion 18 and 19 respectively projecting beyond their sidewalls 2 and 3, in a direction away from the deckplate 7. In the embodiment of Figure 1 the portions 18 and 19 are partially superposed respectively by a projecting portion 20 of the upper plate 15 and a projecting portion 21 of the upper plate 17. In the embodiment of Figure 1 a support plate 22 is welded to terminal edges 23 of the portions 19 and 21, while in the embodiment of Figure 2, the support plate 22 is welded to the terminal edge 23 of the upper plate 17 but seats on, and is welded to, the portion 19 of the base plate 13.

In the embodiment of Figure 1, each sidewall 2, 3 comprises a vertical plate 24, while angled webs 25 are welded between the vertical plates 24 and the deckplate 7 so that the pan 1 can be used with conventional flight bars.

Each sidewall 2, 3 of both embodiments (but not illustrated in Figure 2) incorporates a supporting rib 26 located at or towards each end of the pan 1, these end ribs being apertured at 27, for the passage of the shank of a connecting bolt 28 whereby adjacent pans 1 may be secured end-to-end to one another. Additional ribs intermediate the end ribs 26 may be provided, if required.

In the embodiment of Figure 1, the base plates 11 and 13 project inwardly at portions 29, towards the deckplate 7 while the upper plates 15, 17 also project inwardly at portions 29, above the deckplate 7. Across the projections 29 is welded a floor-engaging, closure plate 31. Also in the figure 1 embodiment, the supporting ribs 26 of the face side sidewall 2 are each provided with an inclined edge 32 across which is welded a ramp plate 33 extending the length of the pan 1 and constituting an inclined leading face to enhance the loading of mineral from the mine floor 4 on to the pan 1 while in the Figure 2 embodiment the ramp plate 33 is welded to projecting portions 18 and 20 of the base plate 11 and upper plate 15, respectively. To the support plate 22 of Figure 1 is also welded a clevis member 34 apertured for the attachment of the advancing rams of conventionally provided roof supports (not shown).

In the embodiment of Figure 2, each sidewall 2, 3 comprises a plate 24A, previously planar, from which a generally central, longitudinally extending notch or "V" groove 35 has been pressed or rolled, the notches or grooves 35 being inward of the pan 1, mutually facing one another, and their apices being welded to longitudinal edges 5, 6 of the deckplate 7. Also in the embodiment of Figure 2 a foot member 36 of each sidewall 2, 3 extends from the projection 29 of each base plate 11, 13 and the closure plate 31 is welded across the foot members 36. Also indicated in chain dotted line in Figure 2 is a toothed rack 37 secured by bolts 38 to the support plate 22, the bolts 38 also serving to secure a spill plate 39 to the support plate 22. The rack 37 has a projecting lower edge 40 which is slidably engaged by a

groove 41 in a slide shoe 42 of a mining machine which, in use, is associated with the pan 1.

As illustrated in Figure 3, interengagement between adjacent ends of adjacent pans 1 is improved by welding to one end of each pan 1 a pair of cast, male end pieces 43, each having a male projection 44 and to the other end of each pan 1 a pair of cast, female end pieces 45, each having a female recess 46, each end piece 43, 45, corresponding in section to that of a conventional, rolled, sigma section pan sidewall.

CLAIMS

1. A line pan comprising a pair of spaced apart, parallel sidewalls, each sidewall being welded to opposite, longitudinal edges of a common interconnecting deckplate, and each sidewall, at a lower edge, being welded to a base plate, and at an upper edge being welded to an upper plate located in a plane parallel to that of the base plate, the base plates of each sidewall having a portion projecting beyond the sidewall in a direction away from the deckplate, at least one projecting portion being at least partially superposed by a projecting portion of an upper plate, and a support plate, for carrying furnishings, welded to both the upper and base plates of one of the sidewalls.

2. A line pan as claimed in Claim 1, wherein each sidewall comprises a vertical plate.

3. A line pan as claimed in Claim 1, wherein each sidewall comprises a plate, previously planar, from which a generally central, longitudinally extending notch or "V" groove has been pressed or rolled, the notches or grooves being inward of the pan and mutually facing one another.

4. A line pan as claimed in any preceding Claim, wherein each sidewall incorporates one supporting rib at or towards each end thereof.

5. A line pan as claimed in Claim 4, wherein each rib is apertured to receive a connecting bolt for securing together adjacent ends of adjacent pans.

6. A line pan as claimed in Claim 4 or Claim 5, wherein one or more intermediate ribs are provided between the ends of the sidewalls.

7. A line pan as claimed in any preceding Claim, wherein each sidewall is seated on its base plate.

8. A line pan as claimed in any preceding Claim, wherein each base plate has an inwardly projecting edge.

9. A line pan as claimed in any preceding Claim, wherein one sidewall — a face side sidewall — has an inclined leading face, provided by a ramp plate, of length corresponding to that of the sidewall, and welded into position.

10. A line pan as claimed in Claim 9, wherein the other sidewall — a goaf side sidewall — carries the support plate.

11. A line pan as claimed in Claim 10, wherein a furnishing in the form of a rack bar or ladder arrangement is secured by bolts to the support plate.

12. A line pan as claimed in Claim 10 or Claim 11, wherein the goaf side sidewall is a generally rectangular box section defined between the upper and base plates, the sidewall and the support plate.

13. A line pan as claimed in Claim 12, wherein supporting ribs are provided within the box section, one being located at least at or adjacent each end of the sidewall, with at least these end ribs being apertured to receive a connecting bolt.

14. A line pan as claimed in any one of Claims 10 to 13, wherein ancillary furnishings are welded to the support plate.

15. A line pan as claimed in any preceding Claim, wherein the lower, conveying run, is closed by a floor engaging closure plate welded between adjacent edges of the base plates of both sidewalls.

16. A line pan as claimed in Claim 2 and any Claim appendant thereto, wherein angled webs are welded across the corners of the deckplates and each sidewall, so that the sidewalls approximate to the conventional sigma section.

17. A line pan as claimed in any preceding Claim, wherein at one end of the pan, each sidewall is provided with a male projection and at the other end with a complementary female recess.

18. A line pan as claimed in Claim 17, wherein end pieces are welded to the ends of the sidewalls of the line pan, each end piece corresponding in profile to a conventional rolled sigma section sidewall.

19. A line pan as claimed in Claim 18, wherein the end pieces are castings.

20. A line pan as claimed in Claim 18 or Claim 19, wherein the end pieces incorporate either a male projection or a female recess.

21. A line pan substantially as hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings.

22. A line pan substantially as hereinbefore described with reference to Figure 3 of the accompanying drawings.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1982. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained